STUDY GUIDE

SPECIAL K

SUBCLASS K

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
BUREAU OF INTEGRATED SCIENCE SERVICES
P. O. BOX 7921
MADISON, WI 53707

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Special K Study Guide - Grades 1-4

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INTRODUCTION

Wisconsin DNR assigns the Special K category to those wastewater treatment facilities which are required by law to have a certified operator in responsible charge, and which do not fit well into our existing subclass categories. If after reading this study guide, you wonder whether you should be covered by a Special K category, please contact your DNR area engineer or operator certification coordinator.

The Special K subclass is intended to cover any treatment processes which are not similar to a standard subclass. Thus, the Special K certification is SITE SPECIFIC. IT CANNOT BE TRANSFERRED TO ANOTHER FACILITY. It is solely intended to allow DNR to ensure that NR 114 purpose is being met; to evaluate whether the operator has adequate knowledge of the processes used at a given plant.

What kind of systems might be required to have an operator certified under Special K? A few examples follow:

* For municipal type systems, a septic tank followed by a dosing chamber and a buried sand filter with a direct surface water discharge.
* An Oil & Grease separator, followed by settling (in a pond or a clarifier) with a direct surface water discharge.
* An elaborate industrial treatment process which is not covered under the electroplating-metal finishing subclass, with direct surface water discharge.
* A landfill leachate treatment system with a direct surface water discharge.

A pretreatment facility is not required under current law (1992) to have a certified operator in responsible charge. If an operator of a pretreatment system wishes to be recognized as certified, they may write the Special K exam for their facility. However certification is not required by state law, and it is not transferable.

There is only ONE Special K exam for Grades 1-4. Based upon the flow and process complexity at the facility, the DNR person grading the exam will classify the system as Grade 1-4. The operator's exam result will be the same level as the system classification.

GENERAL GUIDANCE ON FINDING REFERENCES

1) There should be some written guidance at your facility on operating your system, from the design engineer or manufacturer. Engineering or management staff may have standard references you can review.

2) Depending upon your waste type, there may be EPA publications /manuals which describe the ways your waste can be treated. Contact DNR industrial or pretreatment staff for the general document types and an address.

3) Other professionals in the field may know of good references. There are professional associations for people involved with specific industrial wastes, often with specialized journals. These will provide more up-to-date information.

4) The Sacramento self-study course covers some industrial processes. The Water Environment Federation (formerly Water Pollution Control Federation) also produces training materials. WEF catalogs and Sacramento information are available from DNR Certification Coordinator.

5) The university libraries or larger regional public libraries are a valuable aid, as most have the capability of doing a computer database literature search, defined through the use of key words. The reference librarian can usually help you define your key words and will do the database search. Some university libraries have some of the databases on CD-ROM, and allow you to do it yourself. You receive the citation and usually the abstract as well. The fee charged depends upon the number of citations or the number of pages. A database search gives you access to many more documents than your local library has. You can ask the librarian to borrow the periodical or book cited, under Interlibrary Loan. This generally takes several weeks.

6) Research or studies paid for by the federal government can be obtained through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA, 22161, for about $.10 per page. Buying the document in microfiche is much less expensive. You need to have the NTIS Publication Number to order documents.

KNOWLEDGE OF TREATMENT GOALS: THE DISCHARGE LIMITS

1. Name the pollutants controlled by your treatment plant's discharge permit, for your liquid process discharge. For direct dischargers, these are in the WPDES permit. For pretreatment dischargers, these are either from federal and state categorical regulations or from the local sewer use ordinance). List all effluent pollutants for which monitoring is required. If you discharge to ground water, put the GW monitoring parameters after the treatment process testing.

2. Know the effluent limits for the pollutants listed above. Be sure to include the **UNITS**. Most discharges have a weekly or monthly average limit, a daily maximum or minimum limit and sometimes a total mass limit. You need to be aware of all of these, as they define the treatment goals you must reach.

3. Know the permit required sampling frequency and sample type, for the pollutants listed above.

KNOWLEDGE OF TREATMENT PROCESS: HOW IS IT DONE?

4. Know the frequency of testing for the pollutants or other parameters for process control purposes. Many facilities will measure a pollutant more frequently than required, to help operate the treatment process. Or they will do process control testing, which is not required to be reported in the permit.

5. Make a sketch showing flow through your plant's treatment units. Use solid lines to show the liquid flow, and dashed lines to show the solids/sludge flow. If you have several treatment trains, show them separately. Show chemical addition points and any inline process monitoring points. If you have the ability to divert spills to a holding tank, show where the tank is in the flow scheme.

6. Describe each wastewater treatment process used at your facility and state the purpose of the process (what it is supposed to do). You may use the attached list of processes on p.6 to jog your memory. Include any specific chemicals which are added as part of that process. If you have a different process, be able to name and describe it.

7. List the tasks your substitute must perform to make sure the plant operates correctly (Assume you have to leave town for a day). Be specific. When an adjustment must be made, describe how the operator decides how much is enough.

8. Describe how equipment maintenance is handled at your facility.

TABLE TO ASSIST WITH OBJECTIVES 1-4

Pollutant or Process Control Parameter	Limit (units)	Type* D,W, or M	Permit Req'd Sampling Frequency	Permit Req'd Sample Type	Frequency of Process Control Testing

* Type means what kind of limit, D=Daily, W=Weekly, M=Monthly,
**24-FPC = 24-hr flow proportional composite 24-TC = 24-hr time composite __-MC = an __-hr composite

6. Describe each wastewater treatment process used at your facility and state the purpose of the process (what it is supposed to do). You may use the attached list of processes on p.6 to jog your memory. Include any specific chemicals which are added as part of that process. If you have a different process, be able to name and describe it.

Example List of Processes

Physical Treatment Processes

Activated Carbon Filtration
Ammonia Stripping
Diatomaceous Earth Filtration
Distillation
Electrodialysis
Evaporation
Flocculation
Flotation
Flow Equalization
Foam Fractionization
Freezing
Gas-Phase Separation
Grinding (Comminutors)
Grit Removal
Microstraining
Mixing
Moving Bed Filters
Multimedia Filtration
Rapid Sand Filtration
Recirculating Sand Filter
Reverse Osmosis
Screening
Sedimentation (Settling)
Slow Sand Filtration
Solvent Extraction
Sorption

Chemical Treatment Processes

Carbon Adsorption
Chemical Precipitation
Coagulation
Dechlorination
Disinfection (Chlorine)
Disinfection (Ozone or UV)
Electrochemical Treatment
Ion Exchange
Neutralization (acid/base)
Oxidation
Reduction

Biological Treatment Processes

Activated Sludge
Aeration Lagoons
Anaerobic Lagoons
Anaerobic Digestion
Nitrification-Denitrification
Pre-Aeration
Rotating Biological Contactors

Sand Filters (Buried)
Septic Tank
Spray Irrigation/Land Application
Stabilization Ponds
Trickling Filters

Sludge Treatment & Disposal Processes

Aerobic Digestion
Anaerobic Digestion
Belt Press
Centrifugation
Chemical Conditioning
Chlorine Treatment
Composting
Drying Beds
Elutriation
Flotation Thickening
Gravity Belt Unit
Gravity Thickener (clarifier)
Heat Drying
Heat Treatment
Incineration
Land Application
Landfill
Pressure Filtration (Ex: plate-frame press)
Pyrolysis
Sludge Lagoons
Vacuum Filtration
Vibration
Wet Oxidation

Other

Effluent Recycle to Process Makeup Water
Counter Flow Rinsing

7. List the tasks your substitute must perform to make sure the plant operates correctly (Assume you have to leave town for a day). Be specific. When an adjustment must be made, describe how the operator decides how much is enough.

8. Describe how equipment maintenance is handled at your facility.

9. List the major process variables that can be controlled by the plant operator. [NOTE: These vary greatly depending upon the treatment process; for example, pH, filter loading rate, clarifier detention time, sludge concentration. WHAT ARE THE THINGS IN THE PROCESS THAT YOU CAN AFFECT OR CONTROL?]

10. Describe the operations that must be performed to control the variables listed in 9 (measurements, process control tests, valves turned, etc.) WHAT ACTIONS DO YOU TAKE TO DO THE CONTROLLING?

11. List the reasons why you have altered these process variables in your daily work.

EXAMPLE: PROCESS VARIABLE: *Sludge blanket* [the thing you can affect]

ACTIONS NEEDED TO CONTROL IT: *Measure sludge depth 2x/day, with sludge depth finder, measure sludge consistency with a settling test daily and a TSS test 3x/week, adjust sludge pump between _____ and _____.* [what you do to affect it]

WHY ACTIONS WERE TAKEN: *We keep the sludge blanket at 2-4 feet in order to get good compaction (a sludge concentration between _____ and _____) and clear effluent. Too much sludge causes _____. Too little sludge causes _____.* [why you bother to control this process variable]

Example:

PROCESS VARIABLE_____ ACTIONS NEEDED TO CONTROL IT:

_____

_____

_____

_____

WHY ACTIONS WERE TAKEN: _____

_____

_____

_____

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12. Describe the adjustments you make to the process when the influent loading changes (when it increases, and when it decreases):

13. Describe several operational problems which you experienced at your plant, and explain how they were solved.

14. Describe your plan of action to follow in case of a MAJOR problem/upset at your treatment plant.